

# HARDWOOD PLYV.

(Fourth Edition)

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## COMMERCIAL STANDARD CS35-49

[Supersedes CS35-47]

Effective Date for New Production From December 1, 1949

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A RECORDED VOLUNTARY STANDARD  
OF THE TRADE

UNITED STATES DEPARTMENT OF COMMERCE

CHARLES SAWYER, Secretary

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### COMMERCIAL STANDARD FOR HARDWOOD PLYWOOD

On April 9, 1931, at the instance of the Plywood Manufacturers Association, a general conference of representative manufacturers, distributors, and users adopted a recommended commercial standard for hardwood plywood, which was subsequently accepted in writing by the trade, and published as Commercial Standard CS35-31. The standard was revised in 1942 and 1947.

On September 12, 1949, with the approval of the standing committee, a revision of CS35-47, proposed by manufacturers of hardwood plywood, was circulated to the trade for consideration and approval. Those concerned have since accepted and approved the revised standard as set forth herein.

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# **COMMERCIAL STANDARD CS35-49**

for

## **HARDWOOD PLYWOOD**

(Fourth Edition)

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### **1. PURPOSE**

1.1 These commercial standard rules are established to provide a universal basis of common understanding in the hardwood plywood industry. General adoption and use of this standard will facilitate procurement of the proper type and grade of plywood for its varied uses. Architects, engineers, contractors, and industrial users will be able to specify their needs from nationally recognized types and grades, and this should result in a better understanding between buyer and seller.

### **2. SCOPE**

2.1 This standard provides minimum specifications for four standard types of hardwood plywood, based on the water resistance and durability of the bond, in four standard grades. It covers tests, densities, standard thicknesses, widths and lengths, tolerances, workmanship, packing, inspection, grade marking and certification, method of ordering, and nomenclature and definitions.

### **3. GENERAL REQUIREMENTS**

3.1 *Workmanship*.—All plywood sold as of commercial standard quality shall be well manufactured and free from blisters, wrinkles, laps, or other defects not specifically permitted in the rules for the various grades. Veneers shall be tight and smoothly cut, uniform in thickness, and free from serious buckle.

3.2 *Packing*.—All commercial standard plywood shall be securely packed to insure delivery in a clean and serviceable condition.

### **4. DETAIL REQUIREMENTS**

4.1 There are many factors entering into the manufacture of the different types of hardwood plywood, but since the quality of the plywood is definitely limited by the construction and the adhesive used, four standard types of hardwood plywood have been established as set forth in table 1.

4.2 The specifications given in table 1 establish minimum requirements for each type of plywood; therefore, the majority of the panels manufactured as of commercial standard quality will exceed these minimum specifications.

TABLE 1.—*Types of hardwood plywood*

Limiting factors	Technical	Type I	Type II	Type III
Bond-----	Fully waterproof. Specify-----	Fully waterproof. Specify-----	Water-resistant. Specify-----	Dry bond. Specify. Do.
Species or density of veneer-----	do-----	do-----	do-----	do-----
Grade of faces or face and back-----	2 under 1. 3 under 2.	2 or 3-----	2 or 3-----	2 or 3.
Grade of inner plies-----	None-----	None-----	Specify-----	Specify. Tape.
Grade of lumber core-----	No tape-----	No tape-----	Tape-----	
Edge joints-----				
Maximum veneer thickness, in inches:				
High density-----	1/2-----	1/8-----	No limit-----	No limit.
Medium density-----	1/10-----	3/16-----	do-----	Do.
Low density-----	1/8-----	1/4-----	do-----	Do.
Percentage of wood in face direction-----	45 to 70-----	No limit-----	do-----	Do.
Sanding-----	Specify-----	Specify-----	Specify-----	Specify.
Tests-----	Cyclic wet and dry. Cyclic boil.	Cyclic wet and dry. Cyclic boil.	Cold soak de- lamination.	None.

### 4.3 Types of hardwood plywood.

4.3.1 *Technical—fully waterproof bond.*—The construction of this type is designed to satisfy requirements where plywood may be subjected to highly stressed conditions. The bond shall withstand full weather and marine exposure and shall be unaffected by micro-organisms. The bond shall be of such quality that specimens will withstand the cyclic wet and dry test, and cyclic boil test described in paragraphs 5.4.1 and 5.4.2.

4.3.2 *Type I—fully waterproof bond.*—The bond shall withstand full weather exposure and shall be unaffected by micro-organisms. The bond shall be of such quality that specimens will withstand the cyclic wet and dry test, and cyclic boil test described in paragraphs 5.4.1 and 5.4.2.

4.3.3 *Type II—water-resistant bond.*—The bond shall retain practically all of its strength when occasionally subjected to a thorough wetting and drying. The bond shall be of such quality that specimens will withstand the cold soak test described in paragraph 5.5.

4.3.4 *Type III—dry bond.*—The bond is suitable for use where it will not be subjected to water, dampness, nor high humidities.

4.4 *Densities.*—Veneers are classified by density as follows:

High density	Medium density	Low density
Ash, commercial white.	Ash, black.	Basswood, American.
Beech, American.	Cherry, black.	Chestnut, American.
Birch, yellow, sweet.	Elm, American (white or gray).	Cottonwood, eastern, black.
Elm, rock.	Gum, sweet.	Poplar, yellow.
Maple, black (hard).	Hackberry.	Willow, black.
Maple, sugar (hard).	Magnolia.	
Oak, commercial red.		

High density	Medium density	Low density
Oak, commercial white. Pecan, commercial.	Mahogany, African. Mahogany, American. Maple, red (soft). Maple, silver (soft). New Guinea wood. Oriental wood. Paldao. Prima Vera. Sycamore. Tupelo, water, black. Walnut, American.	

4.5 In determining density of other woods not mentioned above, use a specific gravity of 0.56 and above for high density, 0.41 up to and including 0.55 for medium density, and 0.40 and lower for low density. These are to be based on the oven-dry weight of the wood and the volume at 12-percent moisture content.

4.6 *Grade of faces, backs, and inner plies.*—The grade designates the quality of the face, back, or inner plies; and in grade 1 faces (see table 2) it also designates the matching of veneer, unless otherwise specified under the species.

#### 4.7 Ash and Elm (rotary cut).

4.7.1 *Grade 1 (Good).*—Each face shall be matched for pleasing effect. Small burls, pin knots, mineral streaks, discolorations, inconspicuous small patches, and sapwood shall be admitted. Knots other than pin knots, worm holes, splits, and shake shall not be admitted.

4.7.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

#### 4.8 Basswood (rotary cut).

4.8.1 *Grade 1 (Good).*—Each face shall be made up entirely of sapwood, tight side exposed, not matched. A few small burls, one pin knot per 12-in. square, a few mineral streaks, and inconspicuous small patches shall be admitted. Knots other than pin knots, discolorations, worm holes, splits, and shake shall not be admitted.

4.8.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

#### 4.9 Birch (rotary cut).

4.9.1 *Grade 1 (Good).*—Each face shall be made up of tight, smoothly cut veneer, unselected for uniformity of color, but matched for pleasing effect. A few burls, one pin knot per 12-in. square, mineral streaks, slight discolorations, and inconspicuous small patches shall be admitted. Knots other than pin knots, worm holes, splits, and shake shall not be admitted.

4.9.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

#### 4.10 Gum, Tupelo, Magnolia, Bay, and Poplar (rotary cut—unselected for color).

4.10.1 *Grade 1 (Good).*—Each face shall be of tight, smoothly cut veneer, unselected for uniformity of color, but matched for pleasing

effect. A few burls, two pin knots (average) per 12-in. square, mineral streaks, slight discolorations, a few worm holes if inconspicuously patched or filled, and inconspicuous small patches shall be admitted. Knots other than pin knots, cross breaks, splits, and shake shall not be admitted.

4.10.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

4.11 **Gum, Tupelo, Magnolia, Bay, and Poplar (rotary cut—selected for color).**

4.11.1 *Grade 1 (Good).*—Each face shall be of tight, smoothly cut veneer, selected for uniformity of color and matched for pleasing effect. A few burls, two pin knots (average) per 12-in. square, mineral streaks, slight discolorations, a few worm holes if inconspicuously patched or filled, and inconspicuous small patches shall be admitted. Knots other than pin knots, cross breaks, splits, and shake shall not be admitted.

4.11.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

4.12 **Red Gum (quarter sliced).**

4.12.1 *Grade 1 (Good).*—Each face shall be made up of veneer matched for color and grain at the joints. A few pin knots, sapwood not to exceed 10 percent, and inconspicuous small patches shall be admitted. Knots other than pin knots, burls, mineral streaks, discolorations, worm holes, cross breaks, splits, and shake shall not be admitted.

4.12.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

4.13 **Mahogany (rotary cut).**

4.13.1 *Grade 1 (Good).*—Each face shall consist of one or more pieces of veneer not matched for grain or color and with tight side exposed. Burls, pin knots, a few small mineral or gum streaks, worm holes if inconspicuously filled or patched, and inconspicuous small patches shall be admitted. Knots other than pin knots, discolorations, cross breaks, splits, and shake shall not be admitted.

4.13.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

4.14 **Mahogany (plain sliced or flat cut).**

4.14.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burls, pin knots, a few small mineral or gum streaks, worm holes if inconspicuously filled or patched, and inconspicuous small patches shall be admitted. Knots other than pin knots, discolorations, cross breaks, splits, and shake shall not be admitted.

4.14.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

4.15 **Mahogany (quarter sliced).**

4.15.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. A few small burls, a few pin knots and inconspicuous small patches, a few small mineral or gum streaks, and worm holes, if filled or patched, shall be admitted. Knots other than pin knots, discolorations, cross breaks, splits, and shake shall not be admitted.

4.15.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.16 Maple (rotary cut).**

4.16.1 *Grade 1 (Good).*—Each face shall be matched for pleasing effect. A few small burls and bird's-eyes, a few pin knots, occasional small mineral streaks, slight discolorations, and inconspicuous small patches shall be admitted. Knots other than pin knots, worm holes, splits, and shake shall not be admitted.

4.16.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.17 Maple, Selected White (rotary cut).**

4.17.1 *Grade 1 (Good).*—Each face shall be matched for pleasing effect to show uniform white color throughout. A few small burls and bird's-eyes, a few pin knots, occasional small mineral streaks, slight discolorations, and inconspicuous small patches shall be admitted. Knots other than pin knots, worm holes, splits, and shake shall not be admitted.

4.17.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.18 New Guinea Wood (quarter sliced).**

4.18.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burls, pin knots not exceeding two per 12-in. square, inconspicuous small patches, worm holes if filled or patched, and sapwood not exceeding 10 percent shall be admitted. Knots other than pin knots, mineral streaks, discolorations, cross breaks, splits, and shake shall not be admitted.

4.18.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.19 Oak, Red and White (rotary cut).**

4.19.1 *Grade 1 (Good).*—Each face shall be made of tight, smoothly cut veneer matched for pleasing effect. Burls, pin knots, slight mineral streaks and discolorations, inconspicuous small patches and sapwood shall be admitted. Knots other than pin knots, worm holes, splits, cross breaks, and shake shall not be admitted.

4.19.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.20 Oak, Red and White (half-round and plain sliced or flat cut).**

4.20.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. A few small burls, slight mineral streaks and discolorations, pin knots not exceeding two per 12-in. square, inconspicuous small patches, and sapwood not to exceed 10 percent shall be admitted. Knots other than pin knots, worm holes, splits, and shake shall not be admitted.

4.20.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.21 Oak, White (quarter sliced or sawn, and comb-grain sliced or sawn).**

4.21.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. A few small burls, a few pin knots, mineral streaks not exceeding  $\frac{1}{32}$  in. by 4 in. or  $\frac{1}{16}$  in. by 2 in., and not more than one per 12-in. square, and inconspicuous small patches shall be

admitted. Sapwood, knots other than pin knots, discolorations, worm holes, splits, broken flake, and shake shall not be admitted.

4.21.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.22 Oriental Wood (quarter sliced).**

4.22.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burl, pin knots not exceeding two per 12-in. square, inconspicuous small patches, worm holes if filled or patched, and sapwood not exceeding 10 percent shall be admitted. Knots other than pin knots, mineral streaks, discolorations, cross breaks, splits, and shake shall not be admitted.

4.22.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.23 Paldao (quarter sliced).**

4.23.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burl, pin knots not exceeding two per 12-in. square, inconspicuous small patches, worm holes if filled or patched, and sapwood not exceeding 10 percent shall be admitted. Knots other than pin knots, mineral streaks, discolorations, cross breaks, splits, and shake shall not be admitted.

4.23.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.24 Prima Vera (quarter sliced).**

4.24.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burl, a few pin knots, worm holes if filled or patched, inconspicuous small patches, and sapwood shall be admitted. Knots other than pin knots, mineral streaks, discolorations, cross breaks, splits, and shake shall not be admitted.

4.24.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.25 Walnut (rotary cut).**

4.25.1 *Grade 1 (Good).*—Each face shall be matched for pleasing effect. Burl, pin knots, slight discolorations, inconspicuous small patches, and sapwood shall be admitted. Knots other than pin knots, mineral streaks, worm holes, splits, and shake shall not be admitted.

4.25.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.26 Walnut (half-round and plain sliced or flat cut).**

4.26.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Burl, pin knots not exceeding two per 12-in. square (average), inconspicuous small patches, and sapwood not exceeding 10 percent shall be admitted. Knots other than pin knots, mineral streaks, discolorations, worm holes, splits, and shake shall not be admitted.

4.26.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

**4.27 Walnut (quarter sliced).**

4.27.1 *Grade 1 (Good).*—Each face shall be matched for color and grain at the joints. Pin knots not exceeding two per 12-in. square (average), a few small cross bars, inconspicuous small patches, and sapwood not exceeding 10 percent shall be admitted. Knots other than pin knots, mineral streaks, discolorations, worm holes, splits, and shake shall not be admitted.

4.27.2 *Grades 2, 3, and 4.*—See paragraphs 4.28 to 4.31, and table 3.

# Hardwood Plywood

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**TABLE 2.—Summary of characteristics and defects permitted in Grade 1 (Good) veneer**

		Species									
Defects	Ash and Elm (rotary cut)	Basswood (rotary cut)	Birch (rotary cut)	Gum, Tupelo, Magnolia, Bay, and Poplar (rotary cut)	Unselected for color	Selected for color	Gum, red (quarter sliced)	Mahogany (rotary cut)	Mahogany (plain sliced or flat cut)	Mahogany (quarter sliced)	Maple (rotary cut)
Knots, other than pin knots											
Pin knots	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Burrs	1 per sq ft.	1 per sq ft.	1 per sq ft.	1 per sq ft.	Few	Few	Few	Few	Few	Few	Few
Small	Few, small	Few, small	Few, small	Few, small	No	No	No	No	No	No	No
Hairline checks	Yes	Yes	Yes	Yes	Yes	Slight	do	do	do	do	do
Mineral streaks											
Discolorations											
Worm holes	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Splits or open joints	do	do	do	do	do	do	do	do	do	do	do
Cross breaks											
Patches (small)	Yes	Yes	Yes	Yes	Yes	do	do	do	do	do	do
Sapwood	All	All	All	All	No	No	No	No	No	No	No
Shake	No.	No.	No.	No.	No	No	No	No	No	No	No
New Guinea wood											
Oak, red and white (rotary cut)											
Oak, white (quarter sliced or plain sliced or flat cut)											
Oak, red and white (half-round and plain sliced or flat cut)											
Oriental wood (quarter sliced)											
Paldao (quarter sliced)											
Prima Vera (quarter sliced)											
Walnut (half-round and plain sliced or flat cut)											
Walnut (quarter sliced)											
Knots, other than pin knots											
Pin knots	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Burrs	2 per sq ft.	2 per sq ft.	2 per sq ft.	2 per sq ft.	Few, small	Few, small	Few, small	Few, small	Few, small	Few, small	Few, small
Mineral streaks	Yes	Yes	Yes	Yes	Slight	do	do	do	do	do	do
Discolorations											
Cross bars	do	do	do	do	do	do	do	do	do	do	do
Worm holes	Filled or patched.	No.	No.	No.	do	do	do	do	do	do	do
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Splits or open joints	do	do	do	do	do	do	do	do	do	do	do
Cross breaks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patches											
Broken flakes	10%	10%	10%	10%	do	do	do	do	do	do	do
Sapwood	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Shake											

**4.28 Grade 2.**

4.28.1 Grade 2 applies to all species and is not matched for color or grain. The faces, backs, and inner plies shall be free from open defects to provide a sound, smooth surface. Veneer containing brashness, shake, doze, or any other form of decay is not permitted. Mineral streaks, stain, discoloration, patches, and sapwood shall not be considered defects. Permissible defects may appear singularly (one type only) or as a combination of more than one type. When more than one type of defect is present, their total limitation, computed according to the equivalent defects given in paragraphs 4.31.1 and 4.31.2, shall not exceed the limit specified for any one type.

**4.28.2 Allowable defects.**

- (a) *Sound tight knots:* No single knot shall exceed  $\frac{3}{8}$  in. in average diameter. The sum of the diameters of the knots in any 12-in. square shall not exceed  $\frac{3}{4}$  in.
- (b) *Sound tight burls:* A burl shall be considered equal to a knot of one-half of the diameter of the burl. No single burl shall exceed  $\frac{3}{4}$  in. in average diameter. The sum of the diameters of the burls in any 12-in. square shall not exceed  $1\frac{1}{2}$  in.
- (c) *Splits and open joints:* Splits and open joints not exceeding  $\frac{1}{64}$  in. in width are permitted.
- (d) *Worm holes:* Inconspicuous patched or filled worm holes are allowed. Pinworm holes are permitted.

**4.29 Grade 3.**

4.29.1 Grade 3 applies to all species and is not matched for color or grain. This grade may have the same permissible defects as grade 2 and, in addition, defects as described in paragraph 4.29.2. Veneer containing brashness, shake, doze, or any other form of decay is not permitted. Mineral streaks, stain, discoloration, patches, and sapwood shall not be considered defects. Permissible defects may appear singularly (one type only) or as a combination of more than one type. When more than one type of defect is present, their total limitation, computed according to equivalent defects given in paragraphs 4.31.1 and 4.31.2, shall not exceed the limit specified for any one type.

4.29.2 *Allowable defects.*—The following defects, in addition to those permitted in grade 2, are acceptable in grade 3:

- (a) *Sound tight knots:* No single knot shall exceed  $\frac{3}{4}$  in. in average diameter. The sum of the diameters of the knots in any 12-in. square shall not exceed  $1\frac{1}{2}$  in.
- (b) *Sound tight burls:* A burl shall be considered equal to a knot of one-half of the diameter of the burl. No single burl shall exceed  $1\frac{1}{2}$  in. in diameter. The sum of the diameters of the burls in any 12-in. square shall not exceed 3 in.
- (c) *Knotholes:* No single knothole shall exceed  $\frac{3}{8}$  in. in average diameter. The sum of the diameters of the knotholes in any 12-in. square shall not exceed  $1\frac{1}{2}$  in.
- (d) *Worm holes:* No single worm hole shall exceed 2 in. in length along the grain,  $\frac{1}{8}$  in. in diameter, nor cut across the grain more than  $\frac{3}{8}$  in. The sum of their

widths across the grain shall not exceed  $1\frac{1}{2}$  in. Pin-worm holes are not considered defects.

(e) *Splits or open joints:* Splits or open joints may extend the full length of the panel but shall not occur more frequently than two in any 12-in. width. The width not to exceed  $\frac{1}{16}$  in. for veneer  $\frac{1}{16}$  in. and thinner, and for veneer over  $\frac{1}{16}$  in. in thickness, the width shall not exceed the thickness of the veneer.

(f) *Cross breaks:* Cross breaks are permitted.

(g) *Gum spots and bark pockets:* The area of any gum spot or bark pocket shall be not more than  $\frac{1}{4}$  sq. in. In any 12-in. square the sum of the areas shall not exceed 1 sq. in. Pockets shall be not closer than 24 in. on the same or adjacent grain lines.

#### 4.30 Grade 4 (reject).

4.30.1 Grade 4 (reject) applies to all species and may contain any amount of brash wood, shake, compression failures, doze, nonopen defects, and loose or rough cutting. Open knotholes shall be limited to  $1\frac{1}{2}$  in. in diameter, and the sum of their diameters in any 12-in. square shall not exceed 3 in. Splits shall not exceed  $\frac{1}{4}$  in. in width, but may extend the full length of the panel.

TABLE 3.—Summary of characteristics and defects permitted in Grades 2, 3, and 4 veneers

Defects	Grade 2 <sup>1</sup>	Grade 3 <sup>1</sup>	Grade 4 <sup>1</sup>
Sound tight knots	Max diam, $\frac{3}{8}$ in. Sum diam, $\frac{3}{4}$ in. in any sq ft.	Max diam, $\frac{3}{4}$ in. Sum diam, $1\frac{1}{2}$ in. in any sq ft.	Yes.
Sound tight burls	Max diam, $\frac{3}{4}$ in. Sum diam, $1\frac{1}{2}$ in. in any sq ft.	Max diam, $1\frac{1}{2}$ in. Sum diam, 3 in. in any sq ft.	Do.
Mineral streaks	Yes	Yes	Do.
Discolorations	do	do	Do.
Knotholes	No	Max diam, $\frac{3}{8}$ in. Sum diam, $1\frac{1}{2}$ in. in any sq ft.	Max diam, $1\frac{1}{2}$ in. Sum diam, 3 in. in any sq ft.
Worm holes	Filled or patched if over $\frac{1}{16}$ in. in diam.	Max $\frac{1}{8}$ in. diam by 2 in. (See par. 4.29.2 (d).)	Yes.
Splits or open joints	$\frac{3}{64}$ in	Yes. (See par. 4.29.2 (e).)	$\frac{1}{4}$ in. in width by full length.
Cross breaks	No	Yes	Yes.
Patches	Yes	do	Do.
Sapwood	do	do	Do.
Gum spots and bark pockets	No	Max area, $\frac{1}{4}$ sq in. Sum of areas, 1 sq in. in any sq ft.	Do.
Brashness, shake, doze, and decay.	do	No	

<sup>1</sup> Defects permitted in Grade 1 (Good) shall be admitted in lower grades.

#### 4.31 Equivalent defects.

4.31.1 Each of the following shall be regarded, with respect to its effect, as the equivalent of one  $\frac{3}{8}$ -in. sound knot:

One  $\frac{3}{8}$ -in. knothole.

One  $\frac{3}{4}$ -in. sound tight burl.

One worm hole  $\frac{1}{8}$  in. in diameter by 2 in. in length that cuts across the grain  $\frac{3}{8}$  in.

One gum spot, with the product of the length and width equal to  $\frac{1}{4}$  sq. in.

One bark pocket with the product of the length and width equal to  $\frac{1}{4}$  sq. in.

One split or open joint 12 in. in length and  $\frac{1}{16}$  in. in width.

4.31.2 Each of the following shall be regarded, with respect to its effect, as the equivalent of two  $\frac{1}{8}$ -in. sound knots:

One  $\frac{3}{4}$ -in. sound knot.

One  $1\frac{1}{2}$ -in. sound burl.

One split or open joint 12 in. in length and  $\frac{1}{8}$  in. in width.

4.32 *Grade of lumber core.*—The grade designates the quality of the lumber core and banding requirements, as follows:

4.32.1 *Clear.*—A core of any wood, unless otherwise specifically designated, with any type of tight-glued joint and random width full-length strips. The maximum width of the strips shall be such that warping tendencies are minimized, and it shall be based on the density of the species,<sup>1</sup> straightness of grain, and arrangement of strips with a view to well-balanced stresses. Discolorations shall be admitted, but the wood shall be clear of defects. Mixing of species is not permitted.

4.32.2 *Regular.*—Same specifications as for "Clear" core, but in addition to discolorations, the following are admitted: Sound knots, open defects if securely patched or filled, and butt-joints other than at the edges. Brashness, doze, and mixed species are not permitted.

4.32.3 *Clear edge.*—A core of "Regular" grade with edges clear of defects to permit shaping or molding to a depth of  $1\frac{1}{2}$  in. on all edges.

4.32.4 *Banded.*—A core of any wood, unless otherwise specifically designated, in either "Clear" or "Regular" grade as may be specified, provided with bands to finish net width, as specified, clear of any defect that may prevent required shaping or molding. The purchaser may specify any suitable wood or woods for banded cores. Banded cores may be specified as follows:

Any designated wood:

B1E-----	Banded one end.
B2E-----	Banded two ends.
B1S-----	Banded one side.
B2S-----	Banded two sides.
B3-----	Banded two ends and one side.
B2S1E-----	Banded two sides and one end.
B4-----	Banded two sides and two ends.

4.32.5 Mitred bands or any construction requiring bands other than those described above are to be considered special banded cores, and complete details should appear in the specifications.

#### 4.33 *Edge joints.*

4.33.1 In Technical type and Type I, no tape shall be permitted in the glue line.

4.33.2 In Types II and III, tape is permitted; however, tape on faces and backs must be exposed.

#### 4.34 *Construction.*

4.34.1 *Maximum thickness of veneer (all-veneer construction).*—This is governed by the type of plywood desired and the density of the

<sup>1</sup> The following maximum widths of strips are recommended: High density, 3 in.; medium density,  $3\frac{1}{2}$  in.; and low density, 4 in.

TABLE 4.—*Maximum thickness of veneer*

	Technical type	Type I	Type II	Type III
High density.....	in. $\frac{1}{12}$	in. $\frac{1}{8}$	No limit.....	No limit.
Medium density.....	in. $\frac{1}{10}$	in. $\frac{3}{16}$	do.....	Do.
Low density.....	in. $\frac{1}{8}$	in. $\frac{1}{4}$	do.....	Do.

individual ply. Table 4 specifies the maximum thickness of veneer permitted in the four types of commercial standard hardwood plywood.

4.34.2 *Percentage of veneer in face direction.*—For the Technical type, the total thickness of veneer running in the same direction as the face is limited to 45 to 70 percent of the total panel thickness. This factor helps to govern the stiffness and stability of the panel. For the other three types there are no limits.

4.34.3 *Number of plies.*—This is dependent upon the density and maximum thickness of the veneer, the percentage of veneer in the face direction, the stiffness and stability desired.

4.34.4 *Lumber-core construction.*—Lumber-core plywood is generally used in the manufacture of case goods and for interiors. It is not intended for use where exposed to weather or water. Under severe humidity conditions it may be necessary to use the type of adhesives required in fully waterproof plywood to overcome the problem of micro-organisms, though normally commercial standard lumber-core plywood is manufactured to meet the requirements set up in the "minimum specifications" for Types II and III only. In lumber-core construction, the core or central layer is of lumber usually edge-glued together from narrow strips. Lumber cores are usually  $\frac{1}{8}$  in. or more in thickness, and provision can be made for machining the edges. When exposure requirements are high, all-veneer construction, often 7-, 9-, or 11-ply, to equal the thickness of standard lumber-core plywood is suggested.

4.34.5 *Standard construction.*—In general, plywood shall be constructed with an odd number of plies. All interior plies, except the core or center ply, shall occur in pairs, and the two plies of each pair shall be of the same species, thickness, and direction of grain, but placed on opposite sides of the core. The grain of all plies shall be at right angles to the grain of the adjacent plies and to the ends and edges of the panel. Construction other than the above is considered special construction.

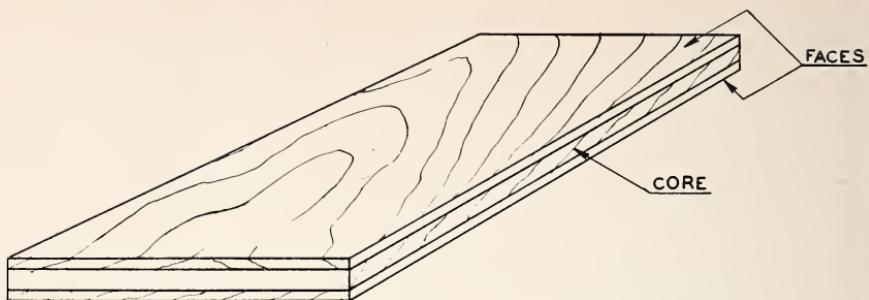
4.35 *Sanding.*—The type of sanding required and number of surfaces to be sanded shall be specified by the purchaser.

4.35.1 *No sanding.*—Surfaces need not be sanded nor tape removed.

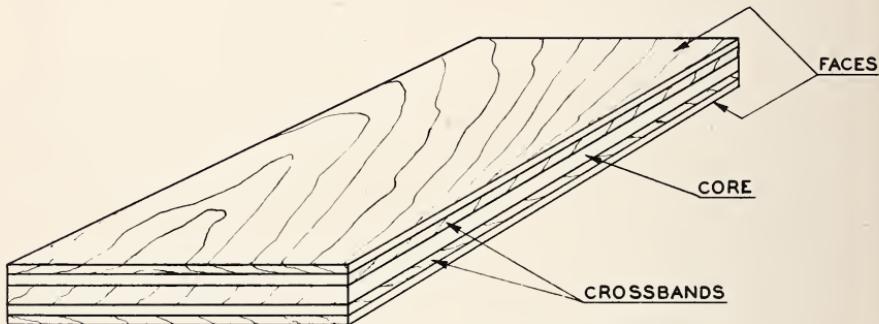
4.35.2 *Rough sanding.*—Sanding hit-and-miss. Tape removal not required.

4.35.3 *Regular sanding.*—Surfaces shall be sanded clean and free of tape. Sander streaks considered no defect.

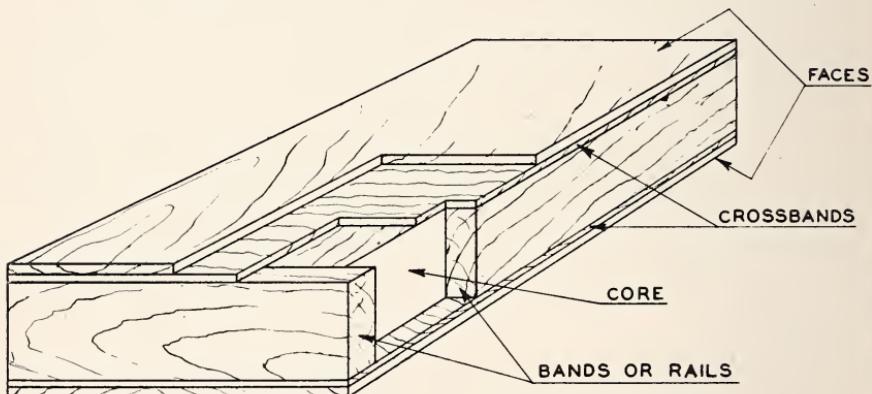
4.35.4 *Polish sanding.*—Surfaces shall be clean and sanded to a polish. Sander streaks shall be considered defects.



THREE-PLY CONSTRUCTION WITH VENEER CORE.



FIVE-PLY CONSTRUCTION WITH VENEER CORE.



FIVE-PLY CONSTRUCTION WITH SAWN LUMBER  
CORE AND BANDING OR RAILING.

FIGURE 1.—*Plywood construction.*

## 5. TESTS<sup>2</sup>

5.1 The manufacturer shall, at the purchaser's request, certify that the panels furnished on the purchaser's order will pass the tests set up in the commercial standard for the particular type or types of hardwood plywood involved. If, in lieu of the certification, the purchaser requires that tests be made, the appropriate standard procedure, as given in paragraphs 5.2 to 5.7, shall be used.

5.2 *Sampling.*—Samples shall be taken at random from 1 percent of the panels in any shipment, but not less than 5 and not more than 10 panels shall be selected. A test piece shall be cut from each end approximately at midwidth of the panel, and from each edge approximately at midlength of the panel, and a fifth piece shall be cut from near the center of the panel. Each piece shall be of sufficient size to provide the required number of test specimens as set forth for the specified type. Purchaser must accept the panels from which test pieces are taken unless the specified tests prove them defective.

5.3 *Shear test.*—Shear tests shall be conducted on specimens of the form shown in figure 2. The ends of the specimen shall be gripped in jaws of the type shown in figure 3, and the load applied at a rate of 600 to 1,000 pounds a minute. Plywood consisting of more than three plies shall be stripped of all except any three selected plies, and then prepared as shown in figure 2. In plywood with face plies thicker than  $\frac{1}{20}$  in., the shear area shall be 1 sq in., as shown in figure 2, specimen A. Specimens of plywood with face plies  $\frac{1}{20}$  in. or less in thickness shall be of the form shown in figure 2, specimen B, in which the shear area shall be reduced, without changing the width of the specimen, to  $\frac{1}{2}$  sq in. Test machine loads obtained from specimens, of  $\frac{1}{2}$  sq in. shear area shall be multiplied by 2, to convert to pounds per square inch, then reduced by 10 percent before comparing with the requirements set forth in tables 5 and 6.

5.4 *Tests for fully waterproof bond (for Technical type and Type I plywood).*

5.4.1 *Cyclic wet and dry test.*—Five specimens of the form shown in figure 2 shall be cut from each of the five test pieces from each sample panel. The specimens shall be submerged in water at room tempera-

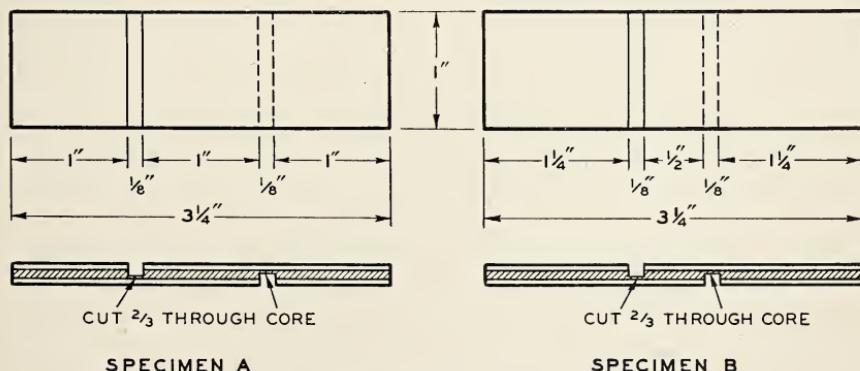


FIGURE 2.—Plywood bond shear-test specimens.

<sup>2</sup> Tests shall be made only when requested by the purchaser.

ture for 48 hr and dried for 8 hr at a temperature of  $145^{\circ}$  F ( $\pm 5^{\circ}$  F) and then followed by two cycles of soaking for 16 hr and drying for 8 hr under conditions described above. The specimens shall then again be soaked for a period of 16 hr and tested, while wet, in a shear testing machine (as described in paragraph 5.3) to failure. Minimum and average wood failure, based on the average strength of the specimens, shall meet the requirements of table 5. The specimens shall also meet the requirements for minimum shear values given in table 6, and shall show no separation of plies at the glue line. If the number of plies exceeds three, at least one-half of the test shall include the innermost joints.

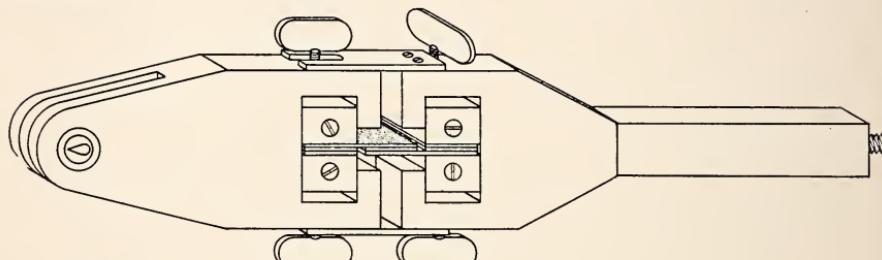


FIGURE 3.—Testing jaws.

**5.4.2 Cyclic boil test.**—Five specimens of the form shown in figure 2 shall be cut from each of the five test pieces from each sample panel, and the shear specimens shall be boiled in water for 4 hr and then dried for 20 hr at a temperature of  $145^{\circ}$  F ( $\pm 5^{\circ}$  F). They shall then be boiled again for 4 hr, cooled in water, and tested while wet. Specimens shall meet the requirements of tables 5 and 6. There shall be no separation of the plies at the glue line. If the number of plies exceeds three, at least one-half of the test shall include the innermost joints.

TABLE 5.—Percentage of wood failure

Average shear strength <i>lb/in.<sup>2</sup></i>	Minimum wood failure <i>Percent</i>	Average wood failure <i>Percent</i>
Under 250	25	50
250 to 350	10	30
Above 350	10	15

TABLE 6.—Minimum shear values required for cyclic and boil tests

Density of veneers	Strength (wet) <i>lb/in.<sup>2</sup></i>
High	290
Medium	210
Low	120

**5.5 Test for water-resistant bond (for Type II plywood) (cold soak for delamination).**—One specimen, 6 in. by 6 in., from each test piece from each sample panel shall be submerged in water at room tempera-

ture for a period of 4 hours, and then dried at a temperature between 70° to 100° F for a period of 20 hours. The cycle shall be repeated, after which the specimens must not show a visible delamination between any two layers of veneer totaling more than 2 in. in continuous length and over  $\frac{1}{8}$  in. in depth at any point. When this test is applied to lumber-core plywood, the bulk of the lumber core shall be cut away to eliminate the possibility of delamination due to the expansive power of the thick core.

5.6 *Dry bond (for Type III plywood).*—No test required.

5.7 *Interpretation of tests.*—For Technical type and Type I plywood, the average and minimum requirements, tables 5 and 6, apply to the five specimens from each of the five test pieces. For Type II plywood, the minimum test requirements apply to each of the test pieces. Test specimens cut through localized defects permitted in the grade or tape permitted in the type shall be discarded. If, on the above basis, there is a failure of more than one test piece for any panel, that panel shall be rejected, and five additional panels shall be selected and tested under the conditions described. All five panels of this second set must pass the required test.

## 6. STANDARD SIZES AND THICKNESSES

6.1 The standard sizes and thicknesses of finished hardwood plywood shall be:

- (a) *Widths:* 24, 30, 36, 42, and 48 in. Tolerance  $\pm \frac{1}{32}$  in.
- (b) *Lengths:* 48, 60, 72, 84, and 96 in. Tolerance  $\pm \frac{1}{32}$  in.
- (c) *Thicknesses:*  $\frac{1}{8}$ ,  $\frac{3}{16}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{13}{16}$ ,  $\frac{7}{8}$ , and 1 in. Tolerance: unsanded panels  $\pm \frac{1}{32}$  in., sanded panels +0 in.,  $-\frac{1}{32}$  in.

6.2 Commercial standard hardwood plywood panels shall be square within  $\frac{1}{16}$  in., measured on the short dimension.

## 7. INSPECTION AND GRADE-MARKING

7.1 *Inspection.*—All hardwood plywood guaranteed to conform to this commercial standard is sold subject to inspection in the white only, and prior to fabrication. Complaints regarding the quality of any shipment must be made within 15 days from receipt thereof.

7.2 *Grade-marking and certification.*—In order to assure the purchaser that he is getting hardwood plywood of the type and grade specified, manufacturers may, individually or in concert with their trade associations, issue certificates with each shipment or grade-mark each panel as conforming to the commercial standard.

## 8. METHOD OF ORDERING

8.1 The established procedure in ordering hardwood plywood is to list the number of pieces, type of plywood, number of plies, thickness, width across the grain, length with the grain, species or density of face ply, density of inner plies in Technical type and Type I only, grade of face, grade of back, grade of lumber core if required, whether sanded or unsanded, and use to which plywood will be put.

8.2 For special types of service, special construction features may be desirable, in which case all applicable standard specification data together with the special construction features should be itemized.

## 9. NOMENCLATURE AND DEFINITIONS

*Back.*—Veneer sheet on under side of plywood panel, corresponding in thickness to face veneer on upper or exposed surface. Grain running parallel to grain of face.

*Banding.*—Also referred to as "railing." Portion of wood of specified kind, extending around one or more sides of piece of core, usually with grain extending the long way. This banding of solid wood facilitates shaping the edges of the piece, or it may be finished flat to cover the several colors presented in the end or side grain of the core.

*Bands, cross.*—See definition under "Crossbanding."

*Bark pocket.*—Comparatively small area of bark around which normal wood has grown.

*Bird's-eye.*—Local sharp depressions in annual rings, accompanied by considerable fiber distortion. Once the depressions are formed, succeeding growth rings follow the same contour for many years. In plain-sawn lumber and rotary veneer the depressions are cut through crosswise and show a series of circlets (portions of annual rings) suggesting rather remotely a bird's eye.

*Blister.*—Spot or area where veneer does not adhere and bulges like a blister.

*Brashness.*—Condition of wood characterized by low resistance to shock and by abrupt failure across the grain without splintering.

*Burl.*—A swirl or twist in the grain of the wood, which usually occurs near a knot but does not contain a knot.

*Centers.*—See definition under "Cores."

*Centers, banded.*—See definition under "Cores, banded."

*Checks.*—Small splits running parallel to grain of wood, caused chiefly by strains produced in seasoning.

*Comb grain (sliced or sawn).*—Also termed "rift sliced" or "rift sawn." A method of producing veneer by slicing or sawing at an angle of approximately  $45^{\circ}$  with the annual rings to bring out certain figures produced by the medullary rays, which are especially conspicuous in oak.

*Compression failures.*—Minute ridges formed by crumpling or buckling of the cells, resulting from excessive compression stresses along the grain.

*Cores,* also referred to as centers, are the innermost portions of plywood. They may be of sawn lumber, either one piece or several pieces joined and glued, or they may be of veneer.

*Cores, banded.*—Cores that have been made with banding on one or more sides. See definition under "Banding."

*Crossbanding.*—Veneer used in the construction of plywood with five or more plies. In five-ply construction, it is placed at right angles between the core and faces.

*Cross-bar.*—Type of figure or irregularity of grain resembling a dip in the grain, running at right angles, or nearly so, to the length of the veneer.

*Cross break.*—Separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage, or to external forces.

*Defects, open.*—Checks, splits, open joints, cracks, loose knots, worm holes, or other defects interrupting the smooth continuity of the surface.

*Density.*—Mass of a body per unit of volume. When expressed in the cgs system, it is numerically equal to the specific gravity of the same substance.

*Discolorations.*—Stains in wood substances. Common veneer stains are sap stains, blue stains, stains produced by the chemical action caused by the iron in the cutting knife coming in contact with the tannic acid in the wood, and those resulting from the chemical action of the glue.

*Doze.*—A form of incipient decay characterized by a dull and lifeless appearance of the wood accompanied by a lack of strength and a softening of the wood substance.

*Flake, broken.*—A breaking or loosening of the flake (medullary ray) or quartered material; most frequent in oak.

*Flat cut.*—Flat-cut veneer sliced parallel to the pith of the log and approximately tangent to the growth rings. Also termed "plain sliced."

*Grain.*—Term applied to the vertical elements of wood as they occur in the living tree. Grain is perhaps most easily delineated in certain woods by the presence of annual layers of more densely aggregated cells or by groups of prominent vessels which form the well-known growth rings. When severed, they may become quite pronounced and the effect referred to as "grain."

*Gum spots.*—Well-defined openings between rings of annual growth, usually containing more or less gum.

*Half-round.*—A manner of cutting veneer to bring out certain beauty of figure, accomplished in the same manner as rotary cutting, except that the piece being cut is secured to a "stay log," a device that permits the cutting of the log on a wider sweep than when mounted with its center secured in the lathe.

*Hardwood.*—General term used to designate lumber produced from broad-leaved or deciduous trees in contrast to softwood produced from evergreen or coniferous trees.

*Hairline.*—Thin perceptible line usually showing at the joint.

*Holes, worm.*—Holes resulting from infestation of worms.

*Holes, pinworm.*—Holes resulting from infestation of worms, and not exceeding  $\frac{1}{16}$  in. in diameter.

*Joint.*—The line between the edges or ends of two adjacent sheets of veneer or strips of lumber core in the same plane.

*Joint, edge.*—Joint running parallel to the grain of the wood.

*Joint, open.*—Joint in which two adjacent pieces of veneer do not fit tightly together.

*Knot.*—Cross section of branch or limb with grain usually running at right angles to that of the piece in which it occurs.

*Knotholes.*—Voids produced by dropping of knots from the wood in which they were originally embedded.

*Knot, open.*—Opening where a portion of the wood substance of the knot has dropped out or where cross checks have occurred to present an opening.

*Knots, pin.*—Sound knots less than  $\frac{1}{4}$  in. in diameter.

*Lap.*—A condition where the veneers used are so misplaced that one piece overlaps the other and does not make a smooth joint.

*Loose side.*—See definition under "Tight side."

*Patches.*—Insertions of sound wood placed and glued into panels from which defective portions have been removed.

*Plywood.*—A cross-banded assembly made of layers of veneer, or veneer in combination with a lumber core or plies joined with an adhesive. Two types of plywood are recognized, namely, veneer plywood and lumber-core plywood. (Generally, the grain of one or more plies is approximately at right angles to the other plies, and almost always an odd number of plies is used.)

*Quartered.*—Method of manufacturing veneer by slicing or sawing to bring out certain figures produced by the medullary or pith rays, which are especially conspicuous in oak. The log is flitched in several different ways to allow the cutting of the veneer in a radial direction.

*Railing.*—See "Banding."

*Rift sliced, rift sawn.*—Also termed "comb-grain." Method of producing veneer by slicing or sawing at an angle of approximately  $45^{\circ}$  with the annual rings to bring out certain figures produced by the medullary rays, which are especially conspicuous in oak.

*Rotary cut.*—Manner of cutting veneer by which the entire log is centered in a lathe and turned against a broad cutting knife, which is set into the log at a slight angle.

*Sapwood.*—Light-colored wood substance occurring in the outer portion of the tree.

*Shake.*—A separation along the grain, the greater part of which occurs between the rings of annual growth.

*Sliced.*—Manner of cutting veneer by which logs or sawn flitches are held securely in a slicing machine and thrust downward into a large knife, which shears off the veneer in sheets.

*Species.*—A distinct kind.

*Splits.*—Separations of wood fiber running parallel with the grain.

*Streaks, mineral.*—Natural discolorations of the wood substance.

*Swirls.*—Irregular grain usually surrounding knots or crotches.

*Tape.*—Strips of gummed paper or cloth used to hold the edges of the veneer together at the joints prior to gluing.

*Tape, perforated.*—Tape perforated for better plywood adhesion. Tape perforated to permit veneers to bond directly to each other through the perforations.

*Tight side.*—Term used with its opposite, "loose side," to refer to veneer cut with a knife. The product as it is cut by the wedge-shaped or beveled knife may be curved, thus producing small ruptures on the convex side, known as the "loose side." The opposite surface, strained slightly in compression but free from any ruptures, is known as the "tight side."

*Worm holes.*—See definitions under "Holes, worm," and "Holes, pinworm."

**10. EFFECTIVE DATE**

10.1 Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this commercial standard was issued by the United States Department of Commerce, effective from December 1, 1949.

**EDWIN W. ELY,**

*Chief, Commodity Standards Division.*

**11. HISTORY OF PROJECT**

11.1 Pursuant to a request from the Plywood Manufacturers Association, a general conference of manufacturers, distributors, and users of plywood made from hardwoods and Eastern red cedar, was held in Chicago, Ill., on April 9, 1931, to consider the adoption of standard grading rules for the guidance of the trade.

11.2 The proposed standard was thoroughly discussed, and after several constructive changes were made the conference recommended that it be circulated to the trade for written acceptance. Accordingly, the recommended standard was submitted to producers, distributors, and users under date of May 29, 1931. Following receipt of written acceptances from a satisfactory majority, an announcement was made August 1, 1931, that the standard would become effective for new production on September 1, 1931.

11.3 *First revision.*—On February 6, 1942, the Hardwood Plywood Institute submitted a proposed revision, which included requirements and tests for three types of adhesive bondage having a high, moderate, and low resistance to moisture, as well as a number of changes in the defects which are or are not permissible in the various species and grades. These changes were approved by the standing committee and the recommended revision was circulated on May 1, 1942, to those directly concerned for written acceptance. Following acceptance by a satisfactory majority, the success of the revision was announced on June 15, 1942, and the revised standard became effective for new production on July 15, 1942, as CS35-42.

11.4 *Second revision.*—Pursuant to a request for revision of the standard, received from the Hardwood Plywood Institute on June 4, 1946, and following approval by the standing committee, the second revision was circulated on September 6, 1946, to the trade for written acceptance. The purpose of this revision was to add one type of bondage to the three already covered, establish requirements for minimum shear strength for fully waterproof bond and high-water-resistance bond, and to revise all grades to bring them abreast of current manufacturing practice and use, with a better description of the defects permitted. Following acceptance by a satisfactory majority, the establishment of the revision was announced on January 20, 1947, as Commercial Standard CS35-47.

11.5 *Third revision.*—Pursuant to a joint request from the Southern Plywood Manufacturers Association and the Hardwood Plywood Institute, and following approval by the standing committee, the third revision was circulated to the trade for consideration and acceptance on September 12, 1949. The purpose of this revision was

to include grades for magnolia, bay, and poplar plywood; to increase the maximum thickness of veneer permitted in Type 1 plywood; and to strengthen the bondage test requirements. Following acceptance by a large majority, the establishment of the revision was announced on November 1, 1949, as Commercial Standard CS35-49, to become effective for new production from December 1, 1949.

## 12. STANDING COMMITTEE

12.1 The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, National Bureau of Standards, which acts as secretary for the committee.

DAWSON ZAUG, American Plywood Corp., New London, Wis. (Chairman).  
G. COLUCCI, Southern Box & Lumber Co., Wilmington, N. C.  
CLARENCE W. DIETTERICH, Southern Plywood Manufacturers Association, 728 West Peachtree St. NW., Atlanta 3, Ga.  
W. F. DURBIN, Hoosier Panel Co., New Albany, Ind.  
R. FAY KULMER, The Mengel Co., Louisville, Ky.  
A. D. PATCHEN, Jamestown Veneer & Plywood Corp., Jamestown, N. Y.  
J. H. TIGELAAR, Haskelite Manufacturing Corp., 701 Ann St., Grand Rapids, Mich.  
B. P. ADAMS, JR., U. S. Plywood Corp., Orangeburg, S. C.  
B. E. BABBITT, National Plywood Distributors Association, Inc., 20 North Wacker Drive, Chicago 6, Ill.  
DON L. DAVIS, Aetna Plywood & Veneer Co., 1731 Elston Ave., Chicago, Ill.  
THOS. R. GUNSAULLUS, Fry-Fulton Lumber Co., 148 Carroll St., St. Louis 4, Mo.  
HAL KEELY, Hal Keely Plywood Co., 3232 East Carson St., Pittsburgh 3, Pa.  
TED THOMPSON, Plywood-Detroit Co., 4445 Bellevue Ave., Detroit 7, Mich.  
GEORGE L. WAETJEN, Milwaukee Plywood Co., 1227 West Bruce St., Milwaukee 6, Wis.  
T. R. WILLIAMS, Ichabod T. Williams & Sons Co., 220 Eleventh Ave., New York, N. Y.  
C. O. CHRISTENSON, Property Requirements Section, Federal Housing Administration, Washington 25, D. C.  
THEODORE I. COE, American Institute of Architects, 1740 New York Ave. NW., Washington, D. C.  
TINSLEY W. RUCKER, Dixon-Powdermaker Furniture Co., P. O. Box 2700, Jacksonville 3, Fla.  
J. T. RYAN, Southern Furniture Manufacturers Association, High Point, N. C.  
WALTER M. SCHALL, Kroehler Manufacturing Co., Bradley, Ill. (representing National Association of Furniture Manufacturers, and National Retail Furniture Association).

**ACCEPTANCE OF COMMERCIAL STANDARD**

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date \_\_\_\_\_

Commodity Standards Division,  
National Bureau of Standards,  
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard CS35-49 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

Production<sup>1</sup> distribution<sup>1</sup> purchase<sup>1</sup> testing<sup>1</sup>  
of hardwood plywood.

We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_  
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_  
(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General Support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

## ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or purchase of hardwood plywood. In accepting the standard, they reserved the right to depart from it as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

### ASSOCIATIONS

#### (General Support)

American Specification Institute, Chicago, Ill.	Atlanta Oak Flooring Co., Atlanta, Ga.
Building Officials Conference of America, Inc., Washington, D. C.	Atlantic Coast Line Railroad Co., Wilmington, N. C.
Carolina Lumber & Building Supply Association, Charlotte, N. C.	Atlantic Plywood Co., Inc., New York, N. Y.
Furniture Manufacturers Association of Grand Rapids, Grand Rapids, Mich.	Back Panel Co., Los Angeles, Calif.
Greater New York Lumber Industries, Inc., New York, N. Y.	Bacon McMillan Manufacturing Co., Stockton, Ala.
Hardwood Plywood Institute, Chicago, Ill.	Bakelite Corp., New York, N. Y., and Bloomfield, N. J.
Kansas City Chapter, The American Institute of Architects, Kansas City, Mo.	Baldwin Plywood & Veneer Co., Gillett, Wis.
Mississippi Retail Lumber Dealers Association, Inc., Jackson, Miss.	Barthmaier, Eugene V., Philadelphia, Pa.
National Building Material Distributors Association, Chicago, Ill.	Bay View Furniture Co., Holland, Mich.
National Hardwood Lumber Association, Chicago, Ill.	Beck Plywood & Lumber Co., Inc., Chicago, Ill.
National Plywood Distributors Association, Chicago, Ill.	Beutler, William, Sioux City, Iowa.
National Woodwork Manufacturers Association, Chicago, Ill.	Bianculli, Palm, Purnell & Russell, Chattanooga, Tenn.
Northern Hemlock & Hardwood Manufacturers Association, Oshkosh, Wis.	Big Rapids Furniture Manufacturing Co., Big Rapids, Mich.
Prefabricated Home Manufacturers' Institute, Washington, D. C.	Birmingham Sash & Door Co., Birmingham, Ala.
Southern Hardwood Producers, Inc., Memphis, Tenn.	Bishop, Horatio W., La Mesa, Calif. (General support.)
Southern Plywood Manufacturers Association, Atlanta, Ga.	Blair Veneer Co., North Troy, Vt.
Southwestern Lumbermen's Association, Kansas City, Mo.	Blue Ridge Plywood Corp., Waynesboro, Va.
Veneer Association, The, Chicago, Ill.	Boehm, George A., New York, N. Y.
Wood-Ply Research Foundation, Inc., Chicago, Ill.	Boeing Airplane Co., Wichita Division, Wichita, Kans.

### FIRMS AND OTHER INTERESTS

Abbott Co., Antrim, N. H.	Borden Co., The, Chemical Division, New York, N. Y. (General support.)
Aberdeen Plywood Corp., Aberdeen, Wash.	Bovard, William R., Kansas City, Mo. (General support.)
Accepted Materials Co., Los Angeles, Calif.	Bradley Plywood Corp., Savannah, Ga.
Adelta Show Case & Fixture Manufacturing Co., Dallas, Tex.	Brazer, Clarence W., New York, N. Y.
Aetna Plywood & Veneer Co., Chicago, Ill.	Brust & Brust, Milwaukee, Wis.
Albany Plywood Co., Inc., Albany, N. Y.	Buckman Laboratories, Inc., Memphis, Tenn.
Algoma Plywood & Veneer Co., Algoma, Wis.	Bucky, Fred W., Jr., Jacksonville, Fla.
Allison & Rible, Los Angeles, Calif.	Buffalo Plywood Corp., Buffalo, N. Y.
Altfillisch, Charles, Decorah, Iowa.	Buffalo Manufacturing Co., Ft. Worth, Tex.
American Chair Co., Sheboygan, Wis.	Burket, Harold E., Ventura, Calif.
American Furniture Co., Batesville, Ind.	Burnham Manufacturing Co., Los Angeles, Calif.
American Plywood Corp., New London, Wis.	California Panel & Veneer Co., Los Angeles, Calif.
American Seating Co., Grand Rapids, Mich.	Calypso Veneer Co., Inc., Calypso, N. C.
Anderson-Tully Co., Memphis, Tenn., and Vicksburg, Miss.	Cameron, William, & Co., Waco, Tex.
Andrews, Jones, Biscoe & Goodell, Boston, Mass.	Camlet, J. Thomas, Passaic, N. J.
Andrews, C. E., Lumber Co., New Bethlehem, Pa.	Carolina Panel Co., Inc., Lexington, N. C.
Angelus Furniture Manufacturing Co., Los Angeles, Calif.	Carolina Veneer & Plywood Co., Inc., Florence, S. C.
	Caswell Runyan, Division of Newport Steel Corp., Goshen, Ind.
	Catalin Corp. of America, Fords, N. J.
	Cavalier Corp., Chattanooga, Tenn.
	Cellarius, Chas. F., Cincinnati, Ohio.
	Central Building Supply, Inc., Baltimore, Md.
	Central Chair Manufacturing Co., Philadelphia, Pa.
	Central of Georgia Railway Co., Savannah, Ga.
	Chrysler Corp., Detroit, Mich.
	Clark, Carl W., Syracuse, N. Y.
	Clarke Veneers & Plywood, Washington, D. C.
	Closs, E., Co., The, Sparta, N. J.
	Cochrane Furniture Co., Inc., Lincolnton, N. C.
	Coffin, R. V., Seattle, Wash.
	Colby, John A., & Sons, Evanston, Ill.
	Columbus Show Case Co., The, Columbus, Ohio.
	Commercial Furniture Co., Chicago, Ill.
	Conrad & Cummings, Binghamton, N. Y.
	Cram & Ferguson, Boston, Mass.

Crawford Door Co., Detroit, Mich.  
 Crawford Furniture Manufacturing Corp., Jamestown, N. Y.  
 Crompton & Knowles Loom Works, Worcester, Mass.  
 Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y.  
 Crowell & Lancaster, Bangor, Maine.  
 Curtis Cos., Inc., Clinton, Iowa.  
 Darby, Bogner & Associates, Milwaukee, Wis.  
 Davenport Cabinet Works, Inc., Davenport, Iowa.  
 Davis Plywood Corp., The, Cleveland, Ohio.  
 Deats Sash & Door Co., Los Angeles, Calif.  
 De Jarnette, Charles W., Des Moines, Iowa. (General support.)  
 Dennis Co., The, Knightstown, Ind.  
 Denny Roll & Panel Co., High Point, N. C.  
 Dietel, George J., Buffalo, N. Y.  
 Dixie Furniture Co., Inc., Lexington, N. C.  
 Dixon-Powdermaker Furniture Co., Jacksonville, Fla.  
 Doehler Metal Furniture Co., Inc., New York, N. Y.  
 Downes Lumber Co., Boston, Mass.  
 Drake Plywood & Veneer Co., Inc., Drake, S. C.  
 Drexel Furniture Co., Drexel, N. C.; Marion, N. C.; and Kingtree, S. C.  
 Dukehart, John K., Portland, Oreg.  
 Edison Wood Products, Inc., New London, Wis.  
 Eggers, E., Plywood & Veneer Co., Two Rivers, Wis.  
 Ehrlich-Harrison Co., Seattle, Wash.  
 English, Miller & Hockett, Hutchinson, Kans.  
 Estes Lumber Co., Birmingham, Ala.  
 Everett, H. F., & Associates, Allentown, Pa.  
 Fairmont Veneers, Inc., Fairmont, N. C.  
 Fellheimer & Wagner, New York, N. Y. (General support.)  
 Fetzer & Fetzer, Salt Lake City, Utah.  
 Fischer, Charles F., & Co., Inc., New York, N. Y.  
 Flanders, L. E., Haverhill, Mass.  
 Flanagan, Eric G., Henderson, N. C.  
 Florida, University of, School of Forestry, Gainesville, Fla.  
 Furter, Wm. C., Honolulu, T. H.  
 Fyles & Rice Co., Inc., Bethel, Vt.  
 Fyr-Fulton Lumber Co., St. Louis, Mo.  
 General Plywood Corp., Louisville, Ky.  
 Georgia-Pacific Plywood & Lumber Co., Inc., New York, N. Y.  
 Gravely Novelty Furniture Co., Inc., Ridgeway, Va.  
 Greene & Wood, Inc., New Bedford, Mass.  
 Hall, Fessenden, Philadelphia, Pa.  
 Haralson & Mott, Ft. Smith, Ark.  
 Harbor Plywood Corp., Chicago, Ill.  
 Harbor Plywood Corp. of California, San Francisco, Calif.  
 Harbor Sales Co., Inc., The, Baltimore, Md., and Washington, D. C.  
 Hard Manufacturing Co., Inc., The, Buffalo, N. Y.  
 Hardwood Products Corp., Neenah, Wis.  
 Harmon, F. S., Manufacturing Co., Tacoma, Wash.  
 Haskellite Manufacturing Corp., Grand Rapids, Mich.  
 Hasty Veneer Co., Inc., Maxton, N. C.  
 Haxby, Bissell & Belair, Minneapolis, Minn.  
 Haworth Roll & Panel Co., High Point, N. C.  
 Henrich Plywood Co., Inc., Buffalo, N. Y.  
 Henry County Plywood Corp., Ridgeway, Va.  
 Higgins, Inc., New Orleans, La.  
 Higgins, J. E., Lumber Co., San Francisco, Calif.  
 Hingham Construction & Supply Co., Hingham, Mass.  
 Hodgdon, Charles, San Gabriel, Calif.  
 Holsman, Holsman, Klekamp & Taylor, Chicago, Ill.  
 Honerkamp, F. W., Co., Inc., New York, N. Y.  
 Hoosier Desk Co., Jasper, Ind.  
 Hoosier Panel Co., The, New Albany, Ind.  
 Hope, Frank L., San Diego, Calif.  
 Houston Sash & Door Co., Houston, Tex.  
 Hunting, R. D., Lumber Co., Cedar Rapids, Iowa.  
 Huss Lumber Co., Plywood Division, Chicago, Ill.  
 Huttig Sash & Door Co., Charlotte, N. C.  
 Huttig Sash & Door Co., Columbus, Ohio.  
 Huttig Sash & Door Co., Dallas, Tex.  
 Huttig Sash & Door Co., Jacksonville, Fla.  
 Huttig Sash & Door Co., Knoxville, Tenn.  
 Huttig Sash & Door Co., Louisville, Ky.  
 Huttig Sash & Door Co., Miami, Fla.  
 Huttig Sash & Door Co., Roanoke, Va.  
 Huttig Sash & Door Co., St. Louis, Mo.  
 Hygrade Cabinet Co., Inc., Mt. Vernon, N. Y.  
 Hyland, Irving L., Boston, Mass.  
 Indiana Desk Co., Inc., Jasper, Ind.  
 Indiana Lumber & Manufacturing Co., Inc., South Bend, Ind.  
 Interstate Veneer Co., Inc., Emporia, Va.  
 Iron City Sash & Door Co., Pittsburgh, Pa.  
 J. & S. Furniture Manufacturing Co., Chicago, Ill.  
 James Lumber Co., Boston, Mass.  
 Jamestown Table Co., Inc., Salamanca, N. Y.  
 Jamestown Veneer & Plywood Corp., Jamestown, N. Y.  
 Jamme, Bernard E., Summit, N. J.  
 Jasper Wood Products Co., Inc., Jasper, Ind.  
 Jones, John Paul, & Leonard Bindon, Seattle, Wash.  
 Kansas State College, Department of Architecture, Manhattan, Kans.  
 Karpen, S., & Bros., Huntington Park, Calif.  
 Kaul Lumber Co., Birmingham, Ala.  
 Kaylo Division of Owens-Illinois Glass Co., Toledo, Ohio.  
 Keich & O'Brien, Warren, Ohio.  
 Keweenaw Manufacturing Co., Adrian, Mich.  
 Kimball, W. W., Co., Chicago, Ill.  
 Kneeland, Arthur, Montreal, Canada.  
 Knipp & Co., Inc., Baltimore, Md.  
 Kreameyer Veneer Co., Junction City, Ky.  
 Kroehler Manufacturing Co., Bradley, Ill., and Naperville, Ill.  
 Kullberg Manufacturing Co., Minneapolis, Minn.  
 Kyle, Herbert S., Charleston, W. Va. (General support.)  
 Laity Cabinet Shops, Hellam, Pa.  
 Lakeside Plywood, Inc., Newport, Vt.  
 Larson Plywood Co., Sheboygan, Wis.  
 Latenser, John, & Sons, Omaha, Nebr.  
 Law, Potter & Nystrom, Madison, Wis.  
 Levin Bros., Inc., Minneapolis, Minn.  
 Levine, Ernest, New Brunswick, N. J.  
 Linwood, Inc., Gillett, Wis.  
 Loeb, Laurence M., White Plains, N. Y.  
 Los Angeles, City of, Los Angeles, Calif.  
 Louck & Hill Co., Richmond, Ind.  
 Loughman Cabinet Co., St. Louis, Mo.  
 Mann & Co., Hutchinson, Kans.  
 Markland, M. B., Contracting Co., Atlantic City, N. J.  
 Martin, Edgar, Chicago, Ill.  
 Mason, George D., & Co., Detroit, Mich.  
 Masten & Hurd, San Francisco, Calif.  
 McClelland Co., The, Davenport, Iowa.  
 Mc Culloch Lumber Co., Atlanta, Ga.  
 Meloy Manufacturing Co., Inc., Shelbyville, Ind.  
 Memphis Plywood Corp., Memphis, Tenn.  
 Memphis Sash & Door Co., Memphis, Tenn.  
 Mengel Co., The, Louisville, Ky.  
 Mersman Bros. Corp., The, Celina, Ohio.  
 Met-L-Wood Corp., Chicago, Ill.  
 Miller & Vrydagh, Terra Haute, Ind.  
 Mills Industries, Inc., Chicago, Ill.  
 Milwaukee Plywood Co., Milwaukee, Wis.  
 Mississippi Products, Inc., Jackson, Miss.  
 Missouri Furniture Co., St. Louis, Mo.  
 Monsanto Chemical Co., Plastics Division, Springfield, Mass.  
 Mooser, William, San Francisco, Calif.  
 Morgan Co., Oshkosh, Wis.  
 Morrison-Merrill & Co., Salt Lake City, Utah;  
 Pocatello, Idaho; and Reno, Nev.  
 Muhlenberg Bros., Reading, Pa.  
 Myrtle Desk Co., High Point, N. C.  
 National Casein Sales, Chicago, Ill.  
 National Plywood Co., Inc., New York, N. Y.  
 National Show Case Co., Columbus, Ga.  
 National Veneer Co., Inc., Lenoir, N. C.  
 Nelson, Albert L., St. Louis, Mo.  
 New Valley Bedding & Furniture Co., Pinedale, Calif.  
 New York Wood Working Corp., Flushing, N. Y.  
 Niagara Plywood Co., Inc., Buffalo, N. Y.  
 Nickey Bros., Inc., Memphis, Tenn.  
 North Carolina Furniture Co., Statesville, N. C.  
 North Carolina State College, Division of Forestry, Raleigh, N. C. (General support.)

Northwestern Cabinet Co., Burlington, Iowa.  
 Norwood Veneer Co., Norwood, N. C.  
 Nurenburg, W. S., Fort Worth, Tex.  
 Officer, Gwynn, Lafayette, Calif.  
 Oregon Forest Products Laboratory, Corvallis, Oreg.  
 (General support.)  
 Owosso Manufacturing Co., Benton, Ark.  
 Pacific Lumber Co., The, San Francisco, Calif.  
 Pacific Manufacturing Co., Santa Clara, Calif.  
 Pacific Mutual Door Co., Tacoma, Wash.  
 Paramount Furniture Co., Warren, Pa.  
 Pascagoula Veneer Co., Pascagoula, Miss.  
 Patten-Blinn Lumber Co., Los Angeles, Calif.  
 Paxton, Frank, Lumber Co., Kansas City, Kans.  
 Pearl City Plywood Co., Inc., Jamestown, N. Y.  
 Pease Woodwork Co., Inc., Cincinnati, Ohio.  
 Peerless Plywood Co., High Point, N. C.  
 Penn Veneer Co., Inc., York, Pa.  
 Pepper, George W., Jr., Philadelphia, Pa.  
 Perry County Plywood Corp., Beaumont, Miss.  
 Picayune Veneer & Plywood Co., Picayune, Miss.  
 Pluswood Industries, Oshkosh, Wis.  
 Plywood Builders Supply Co., Detroit, Mich.  
 Plywood Supply Co., Atlanta, Ga.  
 Plywoods Plastics Corp., Hampton, S. C.  
 Portsmouth Lumber Corp., Portsmouth, Va.  
 Prinsho Veneer Co., Inc., Valdosta, Ga.  
 Quimby, Allen, Veneer Co., Bingham, Maine.  
 Randolph Furniture Co., Inc., Randolph, Vt.  
 Red Lion Cabinet Co., Red Lion, Pa.  
 Reichhold Chemicals, Inc., Detroit, Mich.  
 Resnikoff, Abraham, New York, N. Y.  
 Richardson Bros. Co., Sheboygan Falls, Wis.  
 Richmond Cabinet Co., Richmond, Ind.  
 Rineheimer Bros. Manufacturing Co., Elgin, Ill.  
 Ritchie, James H., & Associates, Boston, Mass.  
 Ritter, Wm., & Bro., Philadelphia, Pa.  
 Rochlin Veneer & Plywood Co., Statesville, N. C.  
 Rockford Chair & Furniture Co., Rockford, Ill.  
 Rockford National Furniture Co., Rockford, Ill.  
 Roddis California, Inc., Los Angeles, Calif.  
 Roddis Co., Chicago, Ill., and St. Louis, Mo.  
 Roddis Co., Inc., Philadelphia, Pa., and Newark, N. J.  
 Roddis Lumber & Veneer Co., Memphis, Tenn.  
 Roddis Lumber & Veneer Co. of Michigan, Detroit, Mich.  
 Roddis Panel & Door Co., Cincinnati, Ohio; Louisville, Ky.; and Charlotte, N. C.  
 Roddis Plywood Corp., Milwaukee, Wis., and Marshfield, Wis.  
 Roddis Plywood & Door Co., Inc., Cambridge, Mass., and New York, N. Y.  
 Roddiscraft, Inc., San Francisco, Calif.  
 Rounds & Porter Co., Wichita, Kans.  
 Russell, Crowell, Mullgardt & Schwarz, St. Louis, Mo.  
 St. Croix Manufacturing Co., Bayport, Minn.  
 St. Paul & Tacoma Lumber Co., Plywood Division, Olympia, Wash.  
 Sanford Sash & Blind Co., Sanford, N. C.  
 Schaeffer, Joseph C., New Rochelle, N. Y.  
 Schmidt, Garden & Erikson, Chicago, Ill.  
 Schofield, George M., Nyack, N. Y.  
 Scott, C. E., Philadelphia, Pa.  
 Scranton Plywood Co., Forty Fort, Pa.  
 Sechrest Veneer Co., Inc., Statesville, N. C.  
 Sellers, G. I., & Sons, Co., Elwood, Ind.  
 Setter Bros., Inc., Cattaraugus, N. Y.  
 Shelbyville Desk Co., Shelbyville, Ind.  
 Siebel Furniture Co., Inc., Railroad, Pa.  
 Simmons Co., Kenosha, Wis.  
 Singer Cabinet Shops, Inc., New York, N. Y.  
 Sirrine, J. E., Co., Greenville, S. C.  
 Sleeper, Harold R., New York, N. Y.  
 Snyder Chemical Corp., Danbury, Conn.

Southern Box & Lumber Co., Wilmington, N. C.  
 Southern Laminating Co., Memphis, Tenn.  
 Southern Plywoods, Greenville, Fla.  
 Southern Resin Glue Co., Fayetteville, N. C.  
 Southwestern Veneer Co., Cotton Plant, Ark.  
 Spainhour Furniture Co., Inc., Lenoir, N. C.  
 Spencer Cardinal Corp., Marion, Ind.  
 Splicewood Corp., Mellen, Wis.  
 Springfield Plywood Corp., Springfield, Oreg.  
 Standard Chair Co., Union City, Pa.  
 Statesville Plywood & Veneer Co., Statesville, N. C.  
 Stickley, L. & J. G., Inc., Fayetteville, N. Y.  
 Stoetzel, Ralph, Chicago, Ill.  
 Strable Hardwood Co., Oakland, Calif.  
 Stravs, Carl B., Minneapolis, Minn.  
 Streeter, Daniel D., Brooklyn, N. Y.  
 Stremming Veneer Co., Inc., Maplesville, Ala.  
 Sweet's Catalog Service, New York, N. Y. (General support.)  
 Synvar Corp., Wilmington, Del.  
 Taylor, Ellery Kirke, Haddonfield, N. J.  
 Temple, Arthur, Davenport, Iowa.  
 Thal, Nelson E., Toledo, Ohio.  
 Thompson & Swain Plywood Co., Tuscaloosa, Ala.  
 Tidewater Plywood Co., Brunswick, Ga.  
 Toledo Metal Furniture Co., Toledo, Ohio.  
 Tonk Manufacturing Co., Chicago, Ill.  
 Trans-Oceanic Trading Co., New Orleans, La.  
 Transogram Co., Inc., Coudersport, Pa.  
 Trexler Lumber Co., Allentown, Pa.  
 Triple H Plywood & Veneer Co., Inc., Monticello, Fla.  
 Twin City Hardwood Lumber Co., St. Paul, Minn.  
 Underwood Veneer Co., Wausau, Wis.  
 Union Furniture Co., Batesville, Ind.  
 United States Plywood Corp., New York, N. Y.  
 United States Plywood Corp. of South Carolina, Orangeburg, S. C.  
 Valdosta Plywoods, Inc., Valdosta, Ga.  
 Vancouver Plywood Co., Vancouver, Wash.  
 Van Pelt, John V., Patchogue, N. Y.  
 Vermont Plywood, Inc., Hancock, Vt.  
 Virginia Polytechnic Institute, Blacksburg, Va. (General support.)  
 Wanke Panel Co., Portland, Oreg.  
 Warsaw Furniture Manufacturing Co., Warsaw, Ky.  
 Waynesboro Veneer Co., Inc., Waynesboro, Ga.  
 Weber Veneer & Plywood Co., Shawano, Wis.  
 Welch, Carroll E., Huntington, N. Y.  
 West, Albert E., Boston, Mass.  
 Western Hardwood Lumber Co., Los Angeles, Calif.  
 White Furniture Co., Mebane, N. C.  
 Widdicombe, John, Co., Grand Rapids, Mich.  
 Wilbur Lumber Co., West Allis, Wis.  
 Willatzen, Andrew, Seattle, Wash.  
 Willett, Consider H., Inc., Louisville, Ky.  
 Williams Furniture Co., Richmond, Ind.  
 Willson, Fred F., Bozeman, Mont.  
 Wisconsin Chair Co., The, Port Washington, Wis.  
 Wisconsin Laminating Co., Chilton, Wis.  
 Wood, Edward J., & Son, Clarksburg, W. Va.  
 Woordercraft Corp., The, Bay City, Mich.  
 Woordercrofty Shops, Inc., The, Wayland, N. Y.  
 Wurlitzer, Rudolph, Co., The, De Kalb, Ill.  
 Zimmerman, A. C., Los Angeles, Calif.

#### UNITED STATES GOVERNMENT

Federal Housing Administration, Underwriting Division, Property Requirements Section, Washington, D. C. (General support.)  
 Housing & Home Finance Agency, Washington, D. C. (General support.)  
 Interior, U. S. Department of the, Bureau of Indian Affairs, Washington, D. C.

## COMMERCIAL STANDARDS

## CS No.

0-40. Commercial standards and their value to business (third edition).  
 1-42. Clinical thermometers (third edition).  
 2-30. Mopsticks.  
 3-40. Stoddard solvent (third edition).  
 4-29. Staple porcelain (all-clay) plumbing fixtures.  
 5-46. Pipe nipples; brass, copper, steel, and wrought-iron (second edition).  
 6-31. Wrought-iron pipe nipples (second edition). Superseded by CS5-46.  
 7-29. Standard weight malleable iron or steel screwed unions.  
 8-41. Gage blanks (third edition).  
 9-33. Builders' template hardware (second edition).  
 10-29. Brass pipe nipples. Superseded by CS5-46.  
 11-41. Moisture regains of cotton yarns (second edition).  
 12-48. Fuel oils (sixth edition).  
 13-44. Dress patterns (fourth edition).  
 14-43. Boys' button-on waists, shirts, junior and sport shirts (made from woven fabrics) (third edition).  
 15-46. Men's pajama sizes (made from woven fabrics) (third edition).  
 16-29. Wall paper.  
 17-47. Diamond core drill fittings (fourth edition).  
 18-29. Hickory golf shafts.  
 19-32. Foundry patterns of wood (second edition).  
 20-49. Vitreous china plumbing fixtures (fifth edition).  
 21-39. Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).  
 22-40. Builders' hardware (nontemplate) (second edition).  
 23-30. Feldspar.  
 24-43. Screw threads and tap-drill sizes.  
 25-30. Special screw threads. Superseded by CS24-43.  
 26-30. Aromatic red cedar closet lining.  
 27-36. Mirrors (second edition).  
 28-46. Cotton fabric tents, tarpaulins and covers (second edition).  
 29-31. Staple seats for water-closet bowls.  
 30-31. Colors for sanitary ware. (Withdrawn as commercial standard March 15, 1948.)  
 31-38. Wood shingles (fourth edition).  
 32-31. Cotton cloth for rubber and pyroxylin coating.  
 33-43. Knit underwear (exclusive of rayon) (second edition).  
 34-31. Bag, case, and strap leather.  
 35-49. Hardwood plywood (fourth edition).  
 36-33. Fourdrinier wire cloth (second edition).  
 37-31. Steel bone plates and screws.  
 38-32. Hospital rubber sheeting.  
 39-37. Wool and part wool blankets (second edition). (Withdrawn as commercial standard, July 14, 1941.)  
 40-32. Surgeons' rubber gloves.  
 41-32. Surgeons' latex gloves.  
 42-49. Structural fiber insulating board (fourth edition).  
 43-32. Grading of sulphonated oils.  
 44-32. Apple wraps.  
 45-48. Douglas fir plywood (eighth edition).  
 46-49. Hosiery lengths and sizes (fourth edition).  
 47-34. Marking of gold-filled and rolled-gold-plate articles other than watchcases.  
 48-40. Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).  
 49-34. Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.  
 50-34. Binders board for bookbinding and other purposes.

## CS No.

51-35. Marking articles made of silver in combination with gold.  
 52-35. Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).  
 53-35. Colors and finishes for cast stone.  
 54-35. Mattresses for hospitals.  
 55-35. Mattresses for institutions.  
 56-49. Oak flooring (third edition).  
 57-40. Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).  
 58-36. Woven elastic fabrics for use in overalls (over-all elastic webbing).  
 59-44. Textiles—testing and reporting (fourth edition).  
 60-48. Hardwood dimension lumber (second edition).  
 61-37. Wood-slat venetian blinds.  
 62-38. Colors for kitchen accessories.  
 63-38. Colors for bathroom accessories.  
 64-37. Walnut veneers.  
 65-43. Methods of analysis and of reporting fiber composition of textile products (second edition).  
 66-38. Marking of articles made wholly or in part of platinum.  
 67-38. Marking articles made of karat gold.  
 68-38. Liquid hypochlorite disinfectant, deodorant, and germicide.  
 69-38. Pine oil disinfectant.  
 70-41. Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).  
 71-41. Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).  
 72-38. Household insecticide (liquid spray type).  
 73-48. Old growth Douglas fir, Sitka spruce, and Western hemlock standard stock doors (fourth edition).  
 74-39. Solid hardwood wall paneling.  
 75-42. Automatic mechanical draft oil burners designed for domestic installations (second edition).  
 76-39. Hardwood interior trim and molding.  
 77-48. Enamelled cast-iron plumbing fixtures (second edition).  
 78-40. Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).  
 79-40. Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).  
 80-41. Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).  
 81-41. Adverse-weather lamps for vehicles (after market).  
 82-41. Inner-controlled spotlamps for vehicles (after market).  
 83-41. Clearance, marker, and identification lamps for vehicles (after market).  
 84-41. Electric tail lamps for vehicles (after market).  
 85-41. Electric license-plate lamps for vehicles (after market).  
 86-41. Electric stop lamps for vehicles (after market).  
 87-41. Red electric warning lanterns.  
 88-41. Liquid burning flares.  
 89-40. Hardwood stair treads and risers.  
 90-49. Power cranes and shovels.  
 91-41. Factory-fitted Douglas fir entrance doors.  
 92-41. Cedar, cypress and redwood tank stock lumber.  
 93-41. Portable electric drills (exclusive of high frequency).  
 94-41. Calking lead.

CS No.	CS No.
95-41. Lead pipe.	128-49. Men's sport shirt sizes—woven fabrics (other than those marked with regular neckband sizes) (second edition).
96-41. Lead traps and bends.	129-47. Materials for safety wearing apparel (second edition).
97-42. Electric supplementary driving and passing lamps for vehicles (after market).	130-46. Color materials for art education in schools.
98-42. Artists' oil paints.	131-46. Industrial mineral wool products, all types—testing and reporting.
99-42. Gas floor furnaces—gravity circulating type.	132-46. Hardware cloth.
100-47. Porcelain-enameded steel utensils (third edition).	133-46. Woven wire netting.
101-43. Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.	134-46. Cast aluminum cooking utensils (metal composition).
102-. (Reserved for Diesel and fuel-oil engines.)	135-46. Men's shirt sizes (exclusive of work shirts).
103-48. Rayon jacquard velour (with or without other decorative yarn) (second edition).	136-46. Blankets for hospitals (wool, and wool and cotton).
104-49. Warm-air furnaces equipped with vaporizing-type oil burners (third edition).	137-46. Size measurements for men's and boys' shorts (woven fabrics).
105-48. Mineral wool insulation for low temperatures (second edition).	138-47. Insect wire screening.
106-44. Boys' pajama sizes (woven fabrics) (second edition).	139-47. Work gloves.
107-45. Commercial electric-refrigeration condensing units (second edition). (Withdrawn as commercial standard September 4, 1947.)	140-47. Testing and rating convectors.
108-43. Treading automobile and truck tires.	141-47. Sine bars, blocks, plates, and fixtures.
109-44. Solid-fuel-burning forced-air furnaces.	142-47. Automotive lifts.
110-43. Tire repairs—vulcanized (passenger, truck and bus tires).	143-47. Standard strength and extra strength perforated clay pipe.
111-43. Earthenware (vitreous-glazed) plumbing fixtures.	144-47. Formed metal porcelain enameled sanitary ware.
112-43. Homogeneous fiber wallboard.	145-47. Testing and rating hand-fired hot water supply boilers.
113-44. Oil-burning floor furnaces equipped with vaporizing pot-type burners.	146-47. Gowns for hospital patients.
114-43. Hospital sheeting for mattress protection.	147-47. Colors for molded urea plastics.
115-44. Porcelain-enameded tanks for domestic use.	148-48. Men's circular flat and rib knit rayon underwear.
116-44. Bituminized-fiber drain and sewer pipe.	149-48. Utility type house dress sizes.
117-49. Mineral wool insulation for heated industrial equipment (second edition).	150-48. Hot-rolled rail steel bars (produced from Tee-section rails).
118-44. Marking of jewelry and novelties of silver.	151-48. Body measurements for the sizing of apparel for infants, babies, toddlers, and children (for the knit underwear industry).
(E) 119-45. <sup>1</sup> Dial indicators (for linear measurements).	152-48. Copper naphthenate wood-preservative.
120-48. Standard stock ponderosa pine doors (third edition).	153-48. Body measurements for the sizing of apparel for girls (for the knit underwear industry).
121-45. Women's slip sizes (woven fabrics).	154-. (Reserved for wire rope.)
122-49. Western softwood plywood (second edition).	155-49. Body measurements for the sizing of apparel for boys (for the knit underwear industry).
123-49. Grading of diamond powder (second edition).	156-49. Colors for polystyrene plastics.
(E) 124-45. <sup>1</sup> Master disks.	157-49. Ponderosa pine and sugar pine plywood.
125-47. Prefabricated homes (second edition).	158-49. Model forms for girls' apparel.
126-45. Tank mounted air compressors.	159-49. Sun glass lenses made of ground and polished plate glass, thereafter thermally curved.
127-45. Self-contained mechanically refrigerated drinking-water coolers.	160-49. Wood-fiber blanket insulation (for building construction).
	161-49. "Standard Grade" hot-dipped galvanized ware.
	162-49. Tufted bedspreads.
	163-49. Standard stock ponderosa pine windows, sash, and screens.

<sup>1</sup> Where "(E)" precedes the CS number, it indicates an emergency commercial standard, drafted under war conditions with a view toward early revision.

**NOTICE.**—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C.

